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Corrigendum to "Heat pump and PV impact on residential low-voltage distribution grids as a function of building and district properties." [Appl. Energy 192(2017) 268–281][☆]

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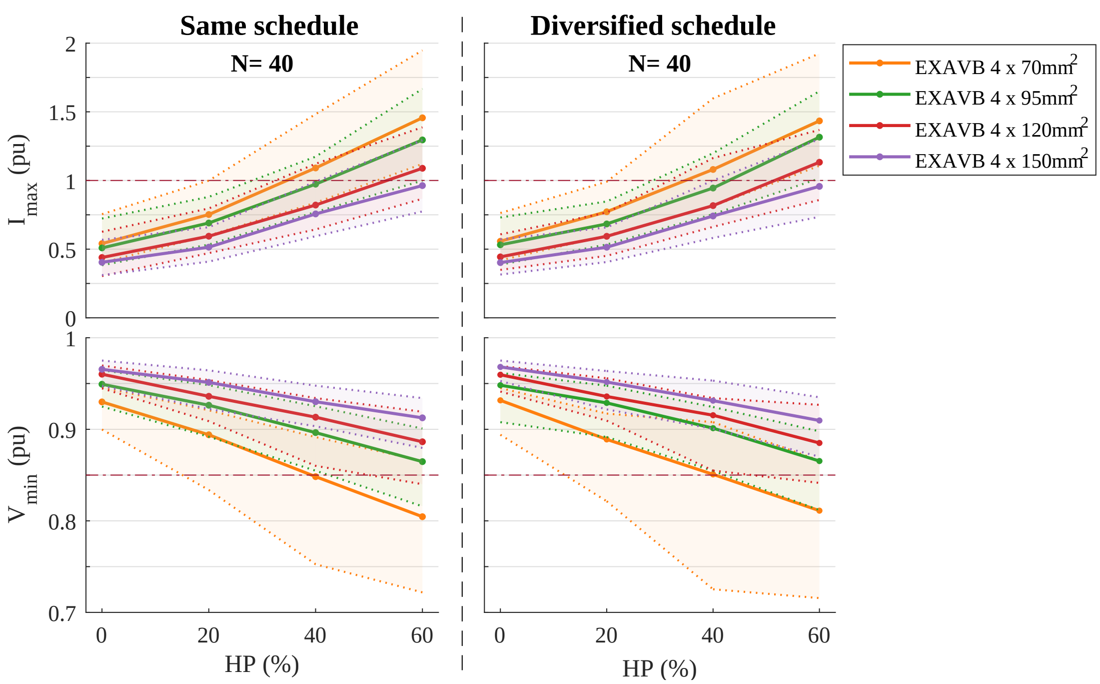
The authors regret that an error occurred in the implementation of the simulation model, rendering its description inaccurate and altering few minor observations. Nevertheless, the main results and conclusions of the paper are not affected.

More specifically, the domestic hot water (DHW) heating schedule has been mistakenly implemented the same in all buildings; therefore, the description in section *2.1.2 Modeling: Heating system*, p. 272, would be more accurate as:

> "*The water heating schedule* ***is the same for all buildings****, starting at 21:30 with a 5 h duration. Consumers are assumed to follow a certain advantageous tariff. Last, anti-legionella cycles are scheduled once a week during the evening, one hour after the daily heating starts [42]. The electrical immersion heater then boosts the water temperature from 55 to 65°C.*"

Instead of:

> "*The water heating schedule differs for the 100 simulated building cases, gradually starting between 21:30 and 00:30 with a 5 h duration. In this way diversity between consumers is taken into account, even though all are assumed to follow a certain advantageous tariff. Last, anti-legionella cycles are scheduled once a week during the evening, one hour after the daily heating starts [42]. The electrical immersion heater then boosts the water temperature from 55 to 65°C. The day of the week varies from house to house.* "



Comparison of Fig. 9 (4th panel) with same schedule (original) and with diversified DHW schedule: I_{max} and V_{min} for rural feeders, based on number of buildings N, heat pump penetration rate HP and cable type. For each cable type the median, 5th and 95th percentiles of all feeders are plotted.

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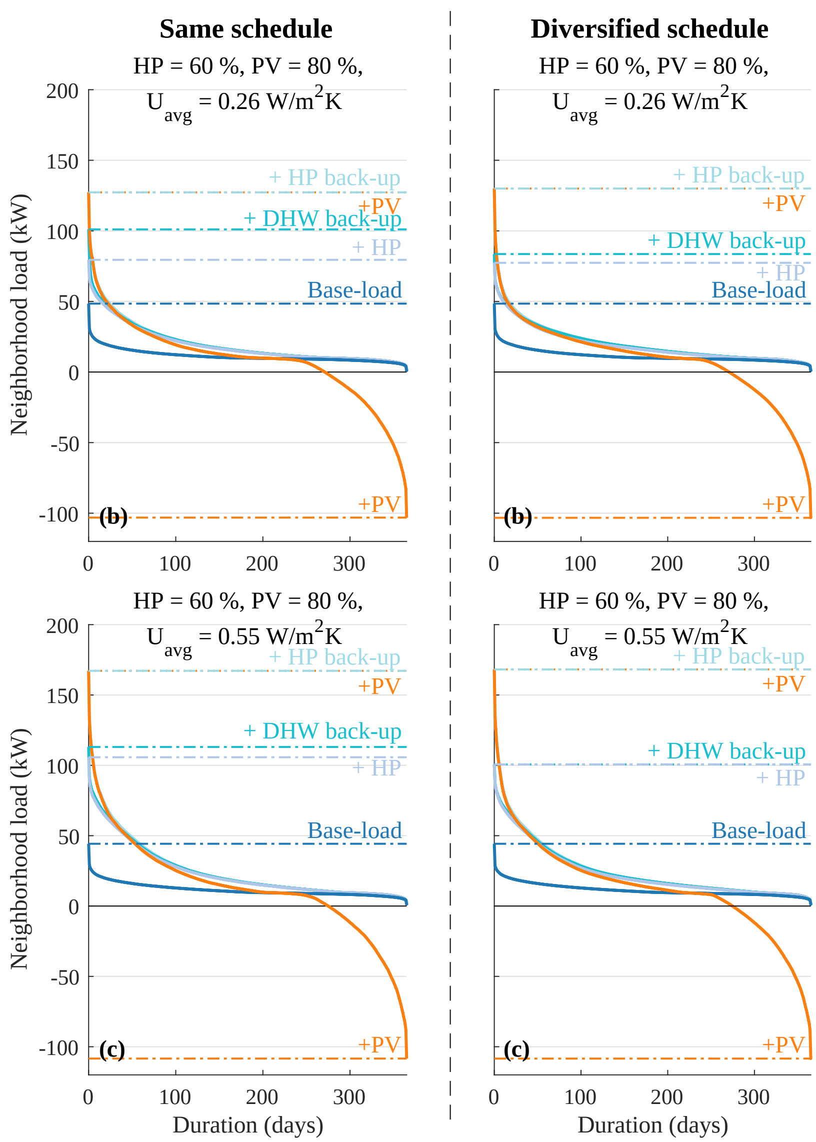
The difference in results caused by this mistake has been investigated, with simulations performed as in the original description. The impact on the main results and conclusions was found to be insignificant, because the total demand remains the same, and the overall peak load and voltage were caused by high needs for space heating, rather than for DHW. Additionally, occupancy remains stochastic, leading to different space heating set points, lighting and plug loads.

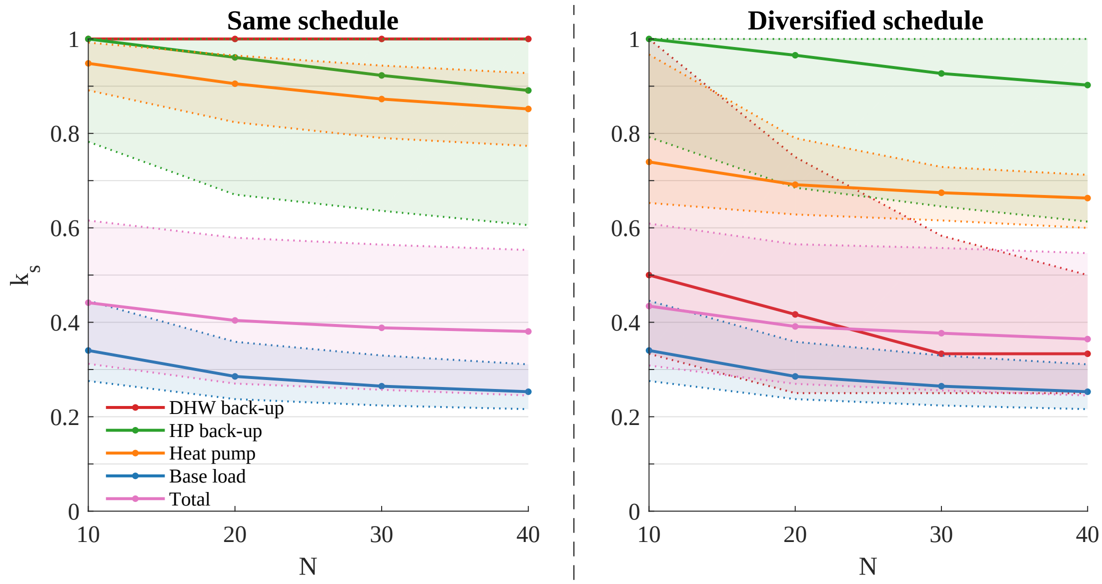
As an example, the 4th panel of Fig. 9 (p. 278) is reproduced for the new diversified DHW heating schedule, and compared to the one in the original paper (same schedule). The distribution of results for both indicators is largely the same, even when split by feeder size, heat pump (HP) penetration rate and cable type. Thus, the observations and conclusions made in the paper are still valid.

Nevertheless, some differences exist for section *3.3 Load profile analysis*, which are explained hereunder.



Comparison of Fig. 7 (panels b and c) with same schedule (original) and with diversified DHW schedule: Load duration curves for rural neighborhoods of N=40 buildings and varying degrees of heat pump and PV penetration, as well as construction quality. Each curve is individually ordered after addition of a supplementary load. Starting from the base load, the heat pump load, DHW immersion back-up, HP instantaneous back-up heater and PV generation are successively included. Peak values are indicated by the dashed horizontal lines.

In panels b and c of Fig. 7, the peak caused by addition of the DHW back-up element load is much lower, or non-existent, compared to previous results. This change can be easily justified by the difference in the DHW schedule implementation. The total peak load remains the same, however, because it occurs in times when space heating is needed rather than hot water.



Comparison of Fig. 8 with same schedule (original) and with diversified DHW schedule: Simultaneity factors k_s of different types of loads. Total is the combination of all other loads. Median (solid lines) and 5th and 95th percentiles are shown (filled areas).

The comment on p. 276 should also be corrected to:

> "*For high penetration rates, large part of this peak is due to the back-up instantaneous electrical heaters for space heating (+HP back-up).*"

Significant decrease can be observed for the simultaneity factors for the DHW back-up loads and the heat pump loads, compared to the original results, as seen in the comparison of Fig. 8. This is explained by the correct implementation of the diversified schedule for DHW heating, which involves both the heat pump and back-up element. Nevertheless, for the total load, the factor remains largely the same, also indicating that the total load peaks are not related to DHW preparation.

The relevant comment on p. 277 should be revised as:

> "*On the contrary, heat pump loads have much higher k_s around **0.7**, due to similar heating schedules for all houses, combined with the absence of buffer storage tanks. Even higher factors, but with wider spread, are found for the heat pump back-up, all operating in very cold weather conditions. For the DHW back-up, **the simultaneity can be very high for some neighborhoods with 10 houses, but decreases fast as more houses are added, despite the fact that all consumers take advantage of the night tariff**. When looking at the total electrical demand, the simultaneity varies between 0.25 and 0.6 for feeders with up to 40 consumers. It is important that these factors, used for network sizing, be updated to account for the use of heat pumps.*"

The authors would like to apologize for any inconvenience caused.